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(54) Espagnolette mechanism

(57) An espagnolette mechanism 10 comprises a gearbox 11 having a gear 13 mounted for rotation in the gearbox 11 under the action of the rotary input 12, a rack 14 in mesh with the gear 13, a sliding rail 15 coupled with the rack 14 and capable of linear reciprocation upon rotation of the gear 13, a locking projection 23 carried by the rail 15 and moveable between locking and release positions with respect to a fixed keeper on the fixed frame, upon movement of the rail 15. A second rail 16 is connected to a slave pinion 17 by drive pins 18,20 and an operating arm 21 such that it moves in the opposite direction to rail 15. The rails 15,16 are slidably mounted on a fixed mounting rail 24 which is adapted to mount the espagnolette mechanism 10 on the face of a frame member of an openable frame.

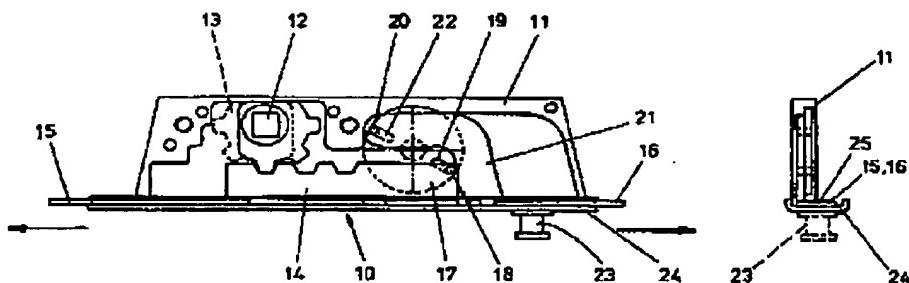


FIG. 1

FIG. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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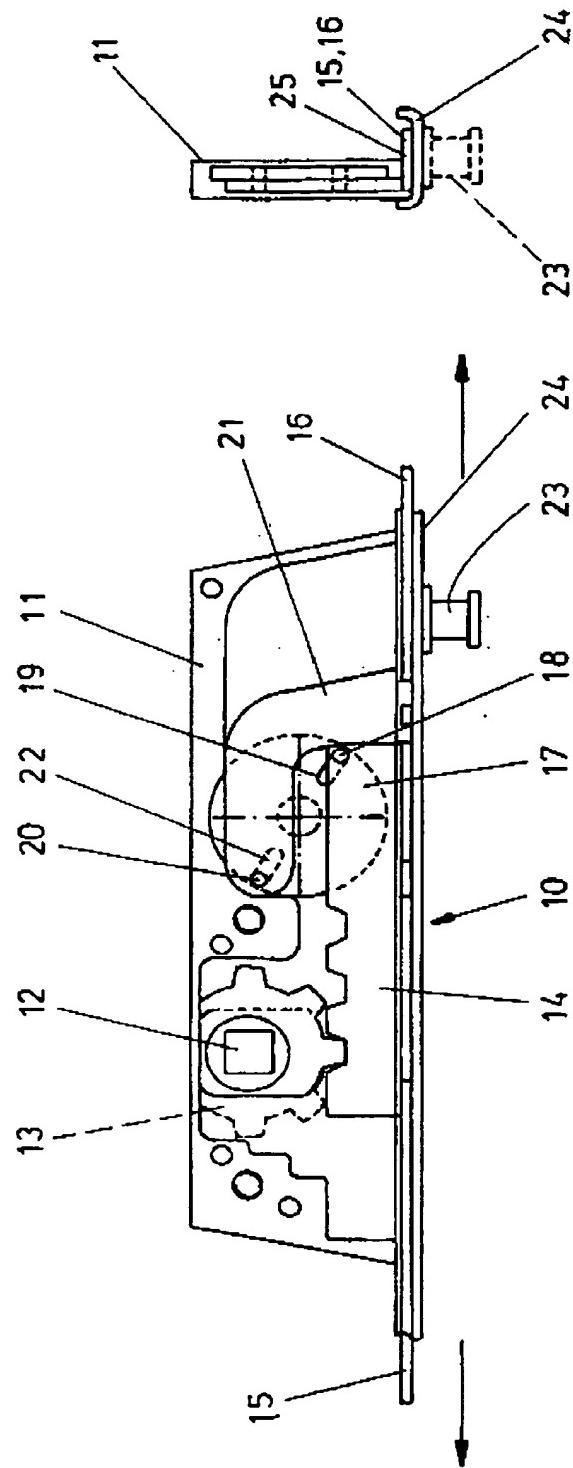


FIG. 2

FIG. 1

2309256**ESPAGNOLETTE MECHANISM**

This invention relates to an espagnolette mechanism which comprises a gearbox having a rotary input, a gear mounted for rotation in the gearbox under the action of the rotary input, a rack in mesh with the gear, a sliding rail coupled with the rack and capable of linear reciprocation upon rotation of the gear in one or the other direction, and a locking projection carried by the rail and movable between locking and release positions with respect to a fixed keeper upon movement of the rail.

Espagnolette mechanisms are used to lock openable frames e.g. window and door frames in closed positions, and usually have an actuating handle mounted on the gearbox and pivotable in one direction to lock the mechanism, and in an opposite direction to release the mechanism. Typically, a drive shaft or spindle is received by a drive socket of the espagnolette gear, and the handle carries, or is mounted on the drive shaft. The rail may carry more than one locking projection, and as is well known may take the form of a "mushroom cam" or other suitable locking projection.

To provide additional security, it is known to mount a so-called "shootbolt" on one end of the rail, and which can move with the rail to a locking position in which it projects beyond the end of the closing face of the openable frame on which the espagnolette mechanism is mounted, such shootbolt then being received by a shootbolt keeper mounted on a perpendicularly extending frame member of the fixed frame in which the openable frame is mounted.

In order to provide a shootbolt at each end of the closing face e.g. at the top and bottom ends of a vertical face of an openable door, it is necessary to provide a pair of sliding rails, and which are coupled (directly or indirectly) with the rack in such a way that they are driven to move in relatively opposite directions i.e. towards or away from each other in order respectively to release or to lock the respective shootbolts and locking projections.

Espagnolette mechanisms are particularly preferred for use with rectangular extruded frame sections of openable

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windows and door frames, and especially UPVC sections, and it is usual for such sections to be formed with specially shaped grooves (known as the "Eurogroove") in which the rail or rails of an espagnolette mechanism can be slidably mounted. Therefore, espagnolette mechanisms are usually manufactured on the assumption that a Eurogroove or similar will be available in order to mount the sliding rails, and also that a mounting recess will be readily available, or be made available, in order to receive the usual espagnolette gearbox housing.

However, there is a potential market for espagnolette mechanisms on openable frame members which lack a Eurogroove (or equivalent) e.g. simple timber framed door or window frames. The present invention therefore has been developed primarily with a view to address this need, and to enable an espagnolette mechanism to be mounted on such frames without need to make any special formations in the face of the frame member on which the espagnolette mechanism is to be mounted.

According to a first aspect of the invention there is provided an espagnolette mechanism for mounting on a frame member of an openable frame to be mounted for movement between open and closed positions in a fixed frame, said mechanism comprising:

a gearbox having a rotary input;

a gear mounted for rotation in the gearbox under the action of the rotary input;

a rack in mesh with said gear;

a sliding rail coupled with the rack and capable of linear reciprocation upon rotation of the gear in one or the other direction;

a locking projection carried by the rail and movable between locking and release positions with respect to a fixed keeper on the fixed frame, upon movement of the rail; and

a fixed mounting rail on which said sliding rail is slidably mounted, said mounting rail being adapted to mount the espagnolette mechanism on one face of said one frame member of the openable frame.

Therefore, an espagnolette mechanism according to the

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first aspect of the invention can be readily mounted on a closing face of one of the frame members of a rectangular openable frame e.g. a door or window frame, and such closing face will usually be on the frame member of the openable frame which is opposite to the frame member provided with a hinged connection to the fixed surrounding frame e.g. via a sliding friction hinge or other hinged connection.

Preferably, the mounting rail (which effectively is a "static" rail) is U-shaped, so as to be readily fitted onto the frame member concerned. The gearbox housing is preferably mounted on the fixed mounting rail in a laterally off-set position with respect to the longitudinal axis of the fixed rail.

In a preferred embodiment, a pair of sliding rails is provided, each slidably mounted on the static rail, and with one rail being coupled directly with the rack to move therewith, and the other rail being coupled indirectly with the rack via a linear motion reversal device. By this arrangement, relatively opposite linear movement is applied to the sliding rails, for either direction of angular rotation of the gear by the rotary input.

Each sliding rail may have a respective "shootbolt" provided on its end remote from the gearbox, and when the sliding rails are moved apart from each other, the respective shootbolts then move into locking engagement with suitable shootbolt keepers mounted in perpendicularly extending frame members of the fixed frame.

The motion reversal device may take any suitable form, and in one preferred arrangement comprises a slave pinion arranged to be rotated by reciprocation of the rack (under the action of the gear or "drive pinion"), the slave pinion having a connection with the rack, and also with the respective sliding rail, such that movement of the rack in one direction causes the slave pinion to apply linear motion to the sliding rail in a relatively opposition direction.

In a convenient arrangement, the slave pinion has a first pinned connection to the rack, and a second, preferably

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diametrically opposed second pinned connection to an operating arm which is coupled to the respective sliding rail.

According to a second aspect of the invention there is provided an espagnolette mechanism which is adapted to be mounted on a mounting face of a frame member of an openable frame to be mounted in a fixed frame for movement between open and closed positions, said mechanism comprising:

a gearbox having a rotary input;

a gear mounted for rotation in the gearbox under the action of the rotary input;

a rack in mesh with said gear;

a sliding rail coupled with the rack and capable of linear reciprocation upon rotation of the gear in one or the other direction; and

a fixed mounting rail on which said sliding rail is slidably mounted, said mounting rail being adapted to mount the espagnolette mechanism on said mounting face of said one frame member of the openable frame.

Preferably, the sliding rail carries at least one locking projection which is movable between locking and release positions with respect to a fixed keeper upon movement of the rail.

Alternatively, or in addition, the sliding rail may carry a shootbolt on one end thereof, and which is movable with the sliding rail between locking and release positions with respect to a shootbolt keeper mounted in a perpendicularly extending frame member of the fixed frame in which the openable frame is mounted.

Preferably, a pair of sliding rails is provided, each slidably mounted on the fixed mounting rail, and coupled with the mechanism in such a way that, for an input rotation of the rotary input in either direction, the sliding rails move in relatively opposite directions.

An espagnolette mechanism according to either aspect of the invention therefore can be readily mounted on a plane face of a frame member of an openable rectangular frame, and without need for any special grooves or recesses to be formed in such

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a plane face to mount the mechanism thereon.

A preferred embodiment of espagnolette mechanism according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawing, in which:

Figure 1 is a side view of the espagnolette mechanism, with part of the housing of the gearbox of the mechanism removed to show the internal operating components of the mechanism; and,

Figure 2 is an end view of the mechanism shown in Figure 1.

Referring now to the drawing, there is shown an espagnolette mechanism which is designated generally by reference 10, and which is intended to be mounted on a closing face of a frame member of a rectangular openable frame e.g. a frame of an openable window or door, such frame being intended to be mounted for movement between open and closed positions (via suitable friction hinges or other hinge connections not shown) in a surrounding fixed rectangular frame (not shown).

The espagnolette mechanism 10 comprises a gearbox having a housing 11, and with a rotary input 12 which may comprise a square section drive shaft or spindle. A gear or drive pinion 13 is mounted for rotation in the gearbox under the action of the rotary input, and a rack 14 is in mesh with the gear 13, so as to be capable of carrying out linear reciprocation, with its direction of movement depending upon the direction of rotary input to the gear 13. Although not shown, usually an operating handle will be coupled with the drive shaft 12, and can be operated in one direction e.g. downwardly pivoting, to release the mechanism, and upwardly in order to move the locking components of the mechanism into locking positions.

At least one sliding rail is coupled with the rack 14, and is capable of linear reciprocation upon rotation of the gear 13 in one or the other directions. A locking projection e.g. a so-called mushroom cam, is carried by the sliding rail and is movable between locking and release positions with respect to a fixed keeper (not shown) upon movement of the

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rail, as will be well known to those of ordinary skill in the art.

In the illustrated embodiment, a pair of sliding rails is provided, namely a first sliding rail 15 which is coupled directly with the rack 14 to move linearly therewith, and a second sliding rail 16 which is coupled indirectly with the mechanism in such a way as to move always in a relatively opposite direction to the linear movement of rail 15. This motion reversal is achieved by a suitable motion reversal device, which in the illustrated embodiment comprises a slave pinion 17 which is driven by the rack 14 to rotate in the same direction as the rotation applied to the main pinion 13. As shown, slave pinion 17 has a pair of diametrically opposed drive pins, one of which is designated by reference 18 and which is carried by the rack 14, and is radially movable relative to slave pinion 17 via a radially extending slot 19, whereas the diametrically opposite drive pin 20 is carried by an operating arm 21, and is radially movable in a guide slot 22 formed in the slave pinion 17.

Referring in particular to Figure 1, clockwise rotation of gear 13 will cause rack 14 and sliding rail 15 to move to the left in the direction of the arrow shown, whereas the clockwise rotation imparted to the slave pinion 17 by the rack 14 will cause sliding rail 16 to move to the right under the action of the drive pins 18 and 20, and operating arm 21.

A single locking projection 23 is shown in Figure 1, mounted on sliding rail 16, and preferably each of the rails 15 and 16 has at least one locking projection, to co-operate with a respective fixed keeper mounted at a suitable position on the surrounding fixed frame in which the openable frame is mounted, and the projections (mushroom cams) move in relatively opposite directions under operation of the gearbox.

As an alternative, but preferably in addition, each of the sliding rails 15 and 16 may have a "shootbolt" (not shown) at its outer end, and which can be moved to a position of locking engagement, projecting beyond the closing face of the frame member, with a respective shootbolt keeper mounted on a

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perpendicularly extending frame member of the fixed frame (not shown).

The espagnolette mechanism shown in Figure 1 is particularly suitable for mounting on a plane mounting or closing face of a frame member, and to this end a static mounting rail 24 is provided, and which, as can be seen from Figure 2 is U-shaped in cross section, to enable it to be readily fitted onto the edge of the frame member. Also, as can be seen in Figure 2, the gearbox 11 is laterally off-set relative to the longitudinal axis 25 of the static mounting rail 24. This facilitates the mounting of the mechanism in the mounting or closing face of the frame member (not shown).

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CLAIMS:

1. An espagnolette mechanism (10) for mounting on a frame member of an openable frame to be mounted for movement between open and close positions in a fixed frame, said mechanism comprising:

a gearbox (11) having a rotary input (12);

a gear (13) mounted for rotation in the gearbox (11) under the action of the rotary input (12);

a rack (14) in mesh with said gear (13);

a sliding rail (15, 16) coupled with the rack (14) and capable of linear reciprocation upon rotation of the gear (13) in one or the other direction;

a locking projection (23) carried by the rail (15, 16) and moveable between locking and release positions with respect to a fixed keeper on the fixed frame, upon movement of the rail (15, 16); and

a fixed mounting rail (24) on which said sliding rail (15, 16) is slidably mounted, said mounting rail (24) being adapted to mount the espagnolette mechanism (10) on one face of said one frame member of the openable frame.

2. An espagnolette mechanism according to claim 1, in which the mounting rail (24) is U-shaped.

3. An espagnolette mechanism according to claim 1 or 2, in which the gearbox housing (11) is mounted on the fixed mounting rail (24) in a laterally off-set position with respect to the longitudinal axis (25) of the mounting rail (24).

4. An espagnolette mechanism according to any one of claims 1 to 3, including a pair of sliding rails (15, 16), each slidably mounted on the fixed mounting rail (24), and with one rail (15) being coupled directly with the rack (14) to move therewith, and the other rail (16) being coupled indirectly with the rack (14) via a linear motion reversal device (17, 21).

5. An espagnolette mechanism according to claim 4, in which each sliding rail (15, 16) has a respective shootbolt provided on its end remote from the gearbox (11), each

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shootbolt being moveable into locking engagement with a corresponding shootbolt keeper mounted in a perpendicularly extending frame member of the fixed frame when the sliding rails (15, 16) are moved apart from each other.

6. An espagnolette mechanism according to claim 4 or 5, in which the motion reversal device comprises a slave pinion (17) arranged to be rotated by reciprocation of the rack (14) under the action of the gear (13), the slave pinion (17) having a connection (18) with the rack (14), and a connection (21) with the respective sliding rail (16), such that movement of the rack (14) in one direction causes the slave pinion (17) to apply linear motion to the sliding rail (16) in a relatively opposite direction.

7. An espagnolette mechanism according to claim 6, in which the slave pinion (17) has a first pinned connection (18) to the rack (14), and a second pinned connection (20) to an operating arm (21) which is coupled to the respective sliding rail (16).

8. An espagnolette mechanism (10) which is adapted to be mounted on a mounting face of a frame member of an openable frame to be mounted in a fixed frame for movement between open and closed positions, said mechanism comprising:

a gearbox (11) having a rotary input (12);

a gear (13) mounted for rotation in the gearbox (11) under the action of the rotary input (12);

a rack (14) in mesh with said gear (13);

a sliding rail (15, 16) coupled with the rack (14) and capable of linear reciprocation upon rotation of the gear (13) in one or the other direction; and

a fixed mounting rail (24) on which said sliding rail (15, 16) is slidably mounted, said mounting rail being adapted to mount the espagnolette mechanism (10) on said mounting face of said one frame member of the openable frame.

9. An espagnolette mechanism according to claim 8, in which the sliding rail (15, 16) carries at least one locking projection (23) which is movable between locking and release positions with respect to a fixed keeper upon movement of the

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rail.

10. An espagnolette mechanism according to claim 8 or 9, in which the sliding rail (15, 16) carries a shootbolt on one end thereof, and which is moveable with the sliding rail between locking and release positions with respect to a shootbolt keeper mounted on a perpendicularly extending frame member of the fixed frame in which the openable frame is mounted.

11. An espagnolette mechanism according to any one of claims 8 to 10, including a pair of sliding rails (15, 16), each slidably mounted on the fixed mounting rail (24), and coupled with the mechanism in such a way that, for an input rotation of the rotary input (12) in either direction, the sliding rails (15, 16) move in relatively opposite direction.

12. An espagnolette mechanism according to claim 11, in which one of said sliding rails (15) is coupled directly with the rack (14) to move therewith, and the other rail (16) is coupled indirectly with the rack (14) via a linear motion reversal device (17, 21).

13. An espagnolette mechanism according to claim 12, in which the motion reversal device comprises a slave pinion (17) arranged to be rotated by reciprocation of the rack (14) under the action of the gear (13), the slave pinion (17) having a connection (18) with the rack (14), and a further connection (21) with the respective sliding rail (16), such that movement of the rack (14) in one direction causes the slave pinion (17) to apply linear motion to the sliding rail (16) in a relatively opposite direction.

14. An espagnolette mechanism according to claim 13, in which the slave pinion (17) has a first pinned connection (18) to the rack (14) and a second pinned connection (20) to an operating arm (21) which is coupled to the respective sliding rail (16).